

**2001 ANNUAL MONITORING REPORT**

**PANOCHE/SILVER CREEK WATERSHED  
MANAGEMENT AND ACTION PLAN  
CALFED GRANT 2000-E02**

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## **1.0 INTRODUCTION**

This report provides a summary of 2001 monitoring activities in the Panoche/Silver Creek Watershed (PSCW) as part of CALFED grant 2000-E02. Work completed in 2001 included initiation of a 3-year monitoring effort to provide data for the characterization of watershed hydrology, water quality, and the effectiveness of sediment and erosion control Best Management Practices (BMPs). Monitoring under CALFED grant 2000-E02 will conclude in Spring 2004.

The PSCW, located on the west side of the San Joaquin Valley, drains into the Fresno Slough and, subsequently, to the San Joaquin River 35 miles west of Fresno, California. The watershed is approximately 300,000 acres in size and ranges in elevation from 137 feet at the confluence of Panoche Creek with the San Joaquin River to approximately 5,000 feet above sea level on the ridge of the Diablo Range, which is part of the Central Coastal Ranges. A map of the watershed, showing major political and landscape features, is provided as Figure 1.

The PSCW monitoring program is designed to provide data to characterize watershed hydrology, water quality, and the effectiveness of sediment and erosion control BMPs. Water quality and quantity data are needed to assess the hydrologic, sediment, and selenium link between the PCSW and the San Joaquin River. Water quantity data also will be used to evaluate the potential effectiveness of erosion control structures (i.e., stormwater detention basins) recommended for higher elevations of the upper watershed (MFG, 2001). BMP effectiveness monitoring will help assess and predict the effectiveness of BMPs for sediment and erosion control within the PCSW at existing and potential future BMP implementation sites.

## **2.0 MONITORING SUMMARIES**

This section provides summaries of streamflow and water quality, rainfall, and BMP site effectiveness monitoring activities conducted in the PSCW during 2001. The summaries provide the general scope and objectives for each type of monitoring (as detailed in the draft Quality Assurance Project Plan [QAPP]; MFG, 2001) and progress and results of 2001 monitoring activities. Figure 2 provides a composite map of monitoring locations within the PSCW. The focus of the first year of monitoring was to organize and establish the necessary components of the monitoring program, as well as collect baseline data needed to meet monitoring objectives. Many of the procedures followed are detailed in the draft QAPP (MFG, 2001), and additional procedures will be included in the revised, final QAPP scheduled for completion in Spring 2002.

### **2.1 Streamflow and Water Quality Monitoring**

Streamflow and water quality will be monitored at the stations identified on Figure 2 and listed below, and include one existing telemetered stream gage along with three new telemetered gages:

1. S-1: Panoche Creek at I-5, existing telemetered stream gage (USGS gage 1125557)
2. S-2: Silver Creek at Panoche Road bridge, new gage
3. S-3: Panoche Creek in Panoche Valley (upstream of confluence with Griswold Creek), new gage
4. S-4: Griswold Creek in Griswold Canyon, new gage

Station S-1, Panoche Creek at I-5, serves as the outflow point for the upper watershed (drainage area upstream of I-5) and, therefore, represents the net effect of hydrologic and water quality processes in the upper watershed. Stations S-2 and S-3 will be used to characterize hydrologic and water quality effects in the Silver Creek and Panoche Creek drainages, respectively. Flows from the Griswold Creek drainage, a tributary to Panoche Creek, will be monitored at Station S-4.

The main goal of the 2001 streamflow and water quality monitoring was to plan, locate, and begin installation of the three new stations. The general objective of streamflow and water

quality monitoring is to evaluate the magnitudes and spatial distribution of streamflow, sediment, and selenium loading throughout the watershed. Specific monitoring objectives include:

1. Evaluate magnitudes of streamflow at the outflow point (I-5) for the upper watershed;
2. Evaluate spatial distribution and magnitudes of streamflow at selected monitoring points throughout the watershed;
3. Develop streamflow data for calibration of a watershed hydrologic model;
4. Evaluate sediment and selenium loading at the outflow point (I-5) for the upper watershed during selected high-flow events;
5. Evaluate spatial distribution of sediment and selenium contributions at selected monitoring points throughout the watershed; and
6. Identify sub-basins of the watershed that contribute relatively significant amounts of flow, selenium and/or sediment to downstream areas.

In 2001, the first phase of construction for the three new streamflow stations was completed. The equipment to construct the three new stations was purchased and concrete pads were poured at all three sites. The 6-ft by 6-ft pads were poured December 4, 5, and 6, 2001 by the PSCW Coordinated Resource Management and Planning Group (CRMP) involving stakeholders including Westlands Water District, USDA – Natural Resources Conservation Service (NRCS), and MFG, Inc. Assembly was started on the new streamflow gages with completion scheduled for Spring 2002.

Each of the three new stations will consist of a gas-bubbler unit connected to a data-logger that is housed in a metal shelter. The shelters are secured to the concrete pads to provide stability and safe housing for the equipment. Stations S-3 and S-4 are planned for connection to ground-based phone lines for data communications while S-2 will relay data via a satellite phone system.

Streamflow data collected from the USGS Panoche Creek at I-5 bridge gage (USGS gage 1125557) were reviewed. A significant flow event was recorded on the days of March 5-8, 2001. The peak discharge of this event was 2,710 cfs corresponding to a gage height of 8.13 feet. Data from this gage are available at

[http://waterdata.usgs.gov/ca/nwis/nwisman/?site\\_no=11255575&agency\\_cd=USGS](http://waterdata.usgs.gov/ca/nwis/nwisman/?site_no=11255575&agency_cd=USGS).

## **2.2 Rainfall Monitoring**

Rainfall monitoring in 2001 involved establishment of a gauging network to allow data retrieval and analysis. The current network includes two previously established telemetered gauges along with data collection from seven manually operated citizen gauges and five rainfall totalizers. The locations of rainfall monitoring gauges are shown on Figure 2 and 2001 rainfall data are summarized in Table 1. The locations of rainfall gauges were selected in order to collect rainfall data over a broad area that covers as much of the upper watershed as feasible. The distribution of gauges was dependent upon citizen participation and access to private land. The purpose of the 2001 activities was to establish an array of rainfall recorders in order to evaluate the spatial distribution of precipitation during storm events throughout the watershed. Specific monitoring objectives include:

1. Observe and characterize patterns and trends of spatial variability of rainfall events throughout the watershed; and
2. Develop rainfall distribution data for input into a watershed hydrologic model.

### **2.2.1 Telemetered Rainfall Gauges**

Two automated rainfall recording stations are currently located in the PSCW. These two stations are identified on Figure 2 as R-1 and R-2, and are located at Panoche Road (west of I-5) and New Idria, respectively (DWR, 2001). The Panoche Road station (R-1) is currently not operating; this station was administered by the California Department of Forestry and Fire Protection (CDF) and remotely provided data via satellite to the California Data Exchange Center (CDEC; <http://cdec.water.ca.gov/cgi-progs/queryF?IDR>). This station first provided hourly precipitation data in 1984. As of February 27, 2001, Station R-1 was non-operational, and CDF is in the process of relocating the station. Data from Station R-1 will be collected when the station returns to operational status. The Idria station (R-2) is operated by the California Department of Water Resources (DWR), provides data via satellite to CDEC, and has been providing data since 1997 (<http://cdec.water.ca.gov/cgi-progs/queryF?PCH>). A summary of 2001 telemetered gauge data is presented in Table 1.

### **2.2.2 Citizen Rainfall Gauges**

Rainfall gauges and data sheets were distributed to participating citizens, including landowners, tenants, and school students, during field visits beginning in December 2001 and continuing into 2002. The citizens were instructed on how to properly locate and install a rainfall gauge as well as given examples of how to record the precipitation data. One gauge was provided to a local resident (an additional gauge was provided to another resident in early 2002), and four gauges were delivered to students at Panoche School in December 2001. The students were instructed about the project goals and how to install and use the rainfall gauges. In addition to the six new gauges that were distributed in 2001 and early 2002, an existing gauge (operated by Mr. Charlie McCullough) was included in the monitoring network. The locations of citizen operated gauges (Stations R-3 through R-9) are shown on Figure 2. Data from the citizen rainfall gauges will be recorded when possible throughout each wet season (November through April). These data are being collected in 2002 and will be included in the 2002 annual monitoring report.

Mr. Charlie McCullough, a lifelong resident in the western part of the PSCW, has collected daily rainfall data from January 1, 1985 to present. These data are a significant contribution to the rainfall monitoring program. Rainfall data measured in 2001 from Mr. McCullough's are summarized in Table 1. Additional data will be obtained from Mr. McCullough's records in 2002 and will be included in the 2002 annual monitoring report.

### **2.2.3 Rainfall Totalizers**

Five rainfall totalizers were installed in early 2002 in the headwaters of Moody and Bitterwater Creeks in the upper watershed (upstream of I-5). These five stations are identified on Figure 2 as RT-1 through RT-5. The totalizers are constructed of 8-inch diameter PVC pipe cut to 5 feet in length. The bottom end of the pipe is capped and sealed. The pipe is installed vertical and is secured to a fence post so it remains upright in strong winds. Each pipe is filled with ½ gallon of cooking oil. The cooking oil prevents evaporation of water so that the total cumulative water depth can be recorded once at the end of the wet season. The rainfall totalizers provide valuable precipitation data for remote locations that are not accessible on a daily basis. This data is being collected in 2002 and will be included in the 2002 annual monitoring report.



## **2.3 Topographic Monitoring of Best Management Practice Sites**

This first year of characterizing the BMP sites included an initial assessment of geologic and geomorphic conditions of the Panoche Creek channel at four representative sites in the PSCW, three sites upstream of I-5 and one site downstream of I-5. Assessment of geomorphic conditions involves characterizing earth surface landforms and interpreting the processes that formed them. The purpose of these first-year efforts was to document the geomorphic conditions in detail at the four sites, and to set up benchmarks from which measurements of future channel changes can be made. Documenting initial conditions at the sites prior to installation of the BMPs or immediately after installation and prior to flow, is critical for successfully evaluating the dominant geomorphic processes at the sites and, thus, for assessing the effectiveness of the sediment and erosion control BMPs in reducing erosion and improving riparian habitat and water quality in the PSCW. The approach involves first defining the geomorphic characteristics of the four sites through development of baseline topographic and geomorphic maps, and then re-evaluating the site conditions following any significant, channel-changing flow events. Development of topographic and geomorphic maps following significant flood flows will allow for evaluation of the locations and amounts of erosion and deposition at each of the sites. Analysis of these channel changes will provide a means to identify dominant fluvial processes at the sites, which will provide information needed to assess appropriate sediment and erosion control BMPs for each site. In short, the interpretation of the dominant erosional and depositional processes at these representative sites will be based on a comparison of the baseline surveys completed in this first year with future surveys completed following significant flood events.

### **2.3.1 Methods**

#### *Baseline Topographic Surveying*

High-resolution topographic surveys (1-foot contour interval) were completed at each of the four BMP sites along Panoche Creek using a digital total station. At each site, semi-permanent markers were installed to allow for site re-occupation during future surveys. The markers are 24-inch long, 0.5-inch diameter rebar, hand driven into the ground. A Global Positioning System (GPS) reading was taken at each marker to facilitate relocation in the field. In addition, topographic cross sections were surveyed at each site to document the size and shape of the

existing channel and adjacent areas. The end points of these sections also were marked with rebar and assigned GPS coordinates so that each cross section line can be re-surveyed in the future, and compared to the baseline profiles. Cross-section orientations were chosen to be as orthogonal across the channel as possible.

### *Baseline Geomorphic Mapping*

At each BMP site, field mapping of geomorphic features was completed using the surveyed topographic maps. Geomorphic features include, but are not limited to, terraces, point bars, cut banks, channel banks, overbank areas, and areas of recent erosion and deposition. During this mapping the locations and heights of various alluvial surfaces formed during different flow stages were delineated. This assessment was based on relative elevation of the surfaces, indicators of flow strength (e.g. clast size, woody debris size), and evidence of recent erosion or deposition.

## **2.3.2 Results**

William Lettis & Associates, Inc. (WLA) and MFG personnel conducted the initial baseline surveys and geomorphic mapping in November 2001. Locations of the four BMP sites are shown on Figure 2. Lands surrounding sites BMP-4, BMP-5, and BMP-6 are used primarily for cattle grazing and pasture land management. Site BMP-2 is surrounded by irrigated cropland in the lower watershed; although it is not located in the upper watershed, Site BMP-2 is included in the BMP site monitoring program because a pipe-and-wire revetment BMP was installed there in 2001.

### **2.3.2.1 BMP 2 – Anderson-Clayton Site**

The survey of the Anderson-Clayton site is about 600 feet wide and 800 feet long, and, in general, is located on an alluvial fan surface that is bisected by the east-flowing Panoche Creek (Appendix A, Figure 7). The site is bisected by a north-trending dirt road used for farm and ginning operations. During high flows, this road is inundated and commonly eroded. Recent post-flood efforts to rebuild the road have resulted in placement of sand (derived from the channel) as a road-fill prism across the channel and overbank areas (Appendix A, Figure 7). As a result of this local artificial fill emplacement across the natural channel bed, high flows commonly pond behind the road fill, and overflow at the upstream end between two tamarisk stands. This

spillway channel flows north-northeast toward the road, borrow, and revetment area. The spillway, or moderate flow channel, is a source of erosion upstream of the dirt road (Appendix A, Figure 7). Approximately 400 feet of a pipe-and-wire revetment has been installed as an erosion control structure along the left channel margin downstream of the roadway. Terraces are generally absent at this site. A large depositional bar exists east of the road, on the southern side of the low-flow channel (Appendix A, Figure 8). Fresh erosion cuts are on the north faces of the bar. An east-west oriented vegetation planting line has been installed along the crest of this sand bar (Appendix A, Figure 7). The low-flow channel is narrow and un-incised when compared to the other BMP sites (Appendix A, Figure 8), and both channel banks appeared to be actively eroding. The sinuosity at this site is relatively low (a value of 1.10). There was no water present in the channel at the time of survey (November 2001). High water discharge could potentially inundate a large portion of the site area. The vegetation present in the overbank areas appears to act as a local sediment trap and storage area. The channel and bank materials are primarily silty sand.

#### **2.3.2.2 BMP 4 – Urritia Site**

The survey of the Urritia site is about 1000 feet wide and 1100 feet long (Appendix A, Figure 5). This site includes part of a series of broad meanders in the Panoche Creek channel, which are incised into several extensive high terrace surfaces (Appendix A, Figure 5). The channel at this site flows roughly west to east, has a relatively high width-to-depth ratio, and wider flood overbank areas than the Hill and Velasquez sites (Appendix A, Figure 6). The sinuosity of the Panoche Creek channel at this site is relatively high (1.16). In the southwest portion of the survey area, stream erosion has produced a 50 foot-high cutbank (Appendix A, Figure 6). Along the upstream end of the south cutbank, riprap has been installed to mitigate the effects of erosion on a buried pipeline at this site. There was standing water in the channel during the time of our survey (November, 2001), in contrast to the other BMP sites. Cattle activity at this site is high. The areas of recent erosion are coincident with the outside of meander bends of Panoche Creek (Appendix A, Figure 5). Active erosion along the north-facing cutbank is dramatic, whereas the erosion on the south-facing bank is less extensive. A large point bar exists on the right bank at the upstream end of the survey area, where the left bank is actively eroding along the outside of a meander bend. At the upstream end of the reach, flow-parallel

bars exist that are inundated during high flow events. A point bar also exists opposite from the steep cutbank downstream. Sand, gravel, and large boulders are present in both point bar areas.

#### **2.3.2.3 BMP 5 – Velasquez Site**

The survey of the Velasquez site covers an area approximately 500 feet wide and 700 feet long, and is bounded to the west by a paved road (New Idria road) and to the north by a property fence line (Appendix A, Figure 3). The Velasquez site extends to the east and includes a set of three high terraces that are actively grazed. The highest terrace slopes gently southwest toward the creek, whereas the two inset terraces slope southeast parallel to the creek (Appendix A, Figure 3). The southwestern part of the site contains the Velasquez house and barns, which are on a high terrace surface. Panoche Creek flows from northwest to southeast through the survey area, and is incised approximately 25 feet into this high surface (Appendix A, Figure 4). Cattle activity at this site is prevalent, with worn paths observed on both sides and ends of the channel (Appendix A, Figure 3). The relatively narrow channel is nearly straight (sinuosity = 1.04), with a broad easterly bend in the upper 300 feet of the surveyed reach. The banks at this site are steep and actively eroding (Appendix A, Figure 4), with the east-facing banks experiencing more erosion, extending up to the terrace surface. Tilted fence posts along the terrace edge also demonstrate active movement of bank material toward the channel. Adjacent to the house, the steep bank is being undercut at the base of the slope. The point bar is composed of pebbles and cobbles, while the low-flow channel is pebbly sand. Bank material is dominantly silty sand.

#### **2.3.2.4 BMP 6 – Hill site**

The survey of the Hill site encompasses an area approximately 300 feet wide and 900 feet long along the east-flowing Panoche Creek channel (Appendix A, Figure 1). The site is bordered by a property fence line to the south, and extends into a grazing area to the north. A dirt road trends east-west along the northern margin of the channel, through a broad, concave-to-the-south meander bend. The relatively narrow creek channel is incised approximately 12 feet into the alluvial sediments. The channel also shows different senses of asymmetry along the reach (Appendix A, Figure 1), as a result of low- and moderate-flow channel migration and/or high-flow fluvial erosion. The channel experiences active animal grazing, as shown by hoofprints present in the channel and on the colluvial slopes. On the southern bank, there are small inset

terraces that may have been rounded by animal activity. The northern bank is steep, and no terraces are present. Both banks exhibit locally steep slopes as a result of recent fluvial erosion on the outside bends of the low-flow channel meanders (Appendix A, Figure 2). However, the northern bank has experienced more erosion, is steeper, and lacks vegetation. The low-flow channel is associated with small point bars on the inside of meander bends and active cut banks on the outside (Appendix A, Figure 1). The sinuosity of the creek at the Hill site is relatively low, with a value of 1.11. (A value of 1.0 represents a perfectly linear channel). The low-flow channel consists of very coarse sand with granules and pebbles. The point bars are composed of pebbles and cobbles with some mantling of colluvial sand from the cut banks. Directly upstream of cross section 1, the channel appears to have recently aggraded, with generally larger median grain sizes and less distinct channel margins. The exposed banks are composed primarily of silty sand with some gravel over consolidated sand.

### **2.3.3 Discussion**

The four BMP sites were chosen, in part, because they form a representative sample of the dominant fluvial / geomorphic processes within the PSCW. The three sites located in the PSCW upstream of I-5 (BMP – 4, – 5, and – 6 ) are characterized by ephemeral, sinuous low-flow channels confined within meandering floodplain/channel complexes. The floodplains are inset into older sandy and gravelly alluvial-fan and fluvial deposits associated with the Panoche Valley alluviated plain. From the upstream site (the Hill site, BMP-6) to the central site (Velasquez site, BMP-5) to the downstream site (Urritia site, BMP-4), the Panoche Creek channel is progressively more deeply incised. At low and moderate flows, fluvial processes at these three sites appear to be dominated by minor amounts of local erosion and deposition primarily within a narrow channel. However, at high discharges, flows at the Hill site likely extend across the entire incised width, and lateral erosion occurs along the outside edges of channel bends. At the Velasquez site, high discharges entering the site appear to be focused on the eroding right bank. In the central part of the site, floodwaters likely extend across the entire floor of the incised valley, and the relatively straight channel likely transports floodwater and sediment downvalley. In contrast, high discharges at the Urritia site probably do not entirely fill the relatively wide valley floor, and instead follow the meandering course of the low- and moderate-flow channels. A primary effect of high discharges at the Urritia site may be severe erosion on the outsides of the abrupt meander right-bend at the upstream end of the site reach, and erosion of the sweeping meander left-bend in

the central and lower parts of the site reach. The outsides of these meander bends are the most likely sites of substantial geomorphic change (i.e., significant erosion) at the Urritia site.

In the PSCW below I-5, the Anderson-Clayton site (BMP-2) is located along the Panoche Creek channel, which is incised into a relatively old, east-sloping alluvial fan. During low- and moderate-flow conditions, discharge is confined to the channel upstream of the roadway and a recently installed culvert placed beneath the roadway. At high discharges, the flow likely exceeds the capacity of the channel and the culvert, and erodes the roadway. The downstream effects of high discharges likely will be influenced by the location and manner in which the water passes over and erodes the roadway, as well as by interaction with in-channel vegetation and the pipe-and-wire revetment along the left bank. Documentation of any significant channel changes produced by stream flow is planned by comparing the baseline topographic and geomorphic maps with similar maps developed from future surveys.

#### **2.4 Proper Functioning Condition Monitoring of Best Management Practice Sites**

In November 2001, MFG staff mapped and evaluated riparian areas at the three BMP sites located in the upper watershed.

For the three areas, the “Proper Functioning Condition” (PFC) methodology was used to provide a baseline condition reference. An interdisciplinary work group at the Bureau of Land Management developed the PFC method for rapid assessment of a riparian area (USDI, 1999), which can then be used for comparison of conditions before, during, and after implementation of BMPs.

Riparian areas in “Proper Functioning Condition” are found to be functioning properly when adequate vegetation, landform, or large woody debris are present to: dissipate stream energy associated with high waterfowls, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground water re-charge; and develop root masses that stabilize streambanks against cutting action. The functioning condition of a riparian area is a result of interactions among geology, soil, water, and vegetation.

#### **2.4.1 BMP 4 – Urittia Site**

The Urittia site is characterized as a Functional-at-Risk reach. The trend here is assessed as upward, due to the presence of native riparian and wetland species in the channel, although the presence of severe bank erosion indicates that the area is actually Non-Functioning (not dissipating high flows). The factor that appeared to be most influential to the continued upward trend was the timing and intensity of livestock utilization. Most interesting at this property was the difference in riparian vegetative communities above and below the road crossing and fenceline. Below the road crossing, the species diversity was low in comparison to the riparian area above the fence. Above the fenceline, presence of 50 to 60 cottonwood (*Populus* sp.) seedlings (under one year old) and 20 to 30 cottonwood saplings (2 to 3 years old) in or near the channel indicated some difference in livestock utilization between the two pastures. Combined with the apparent multi-year survival of the cottonwood saplings, the presence of wetland-obligate species such as sedges (*Carex* sp.) and rushes (*Juncus* sp.) indicated that enough year-round water was present for the successful re-establishment of riparian vegetation of sufficient density to provide flood energy dissipation.

#### **2.4.2 BMP 5 – Velasquez Site**

The Velasquez site is characterized as a Non-Functional reach. Non-Functional areas are those that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, and providing other benefits as listed above. Soil conditions, combined with heavy livestock trailing and very low vegetative cover, indicated that the trend at this site was downward, although geomorphic evaluation did not necessarily support the hypothesis of an overall downward trend. The only factor that appeared to be within the control of the landowner was the timing and intensity of livestock utilization.

This reach begins immediately at a fenceline with another landowner, where conditions are notably different in terms of the presence of woody vegetation, herbaceous cover, and bank steepness and erosion. Woody vegetation in this reach was limited to a group of alder trees (*Alnus* sp.) at the edge of the right bank, approximately 15 feet above the channel bottom. The alder trees are not a natural component of the local riparian vegetation community.

### **2.4.3 BMP 6 – Hill Site**

The Hill site was rated as Functional-at-Risk. There was not an apparent trend, although it was noted that this site appeared relatively stable (as compared to other sites). Overall vegetative cover was very low, with no woody vegetation present. The reach and proposed exclosure area is defined by two fencelines. Above and below each of these fencelines, the sinuosity of the channel appears to be greater, with point bars covered in cobbles of larger size than in the proposed exclosure. These areas of larger cobble also appear to have greater species diversity, likely due to benefits associated with cobble mulch (higher soil moisture, modulated soil temperatures, surface shading and wind protection).



### **3.0 CONCLUSION**

The 2001 monitoring program in the PSCW included, initial construction of three new streamflow/water quality stations and data collection from one existing streamflow monitoring station, installation of new rainfall gauges and data collection at previously existing rainfall gauges, and baseline topographic, geomorphic, and proper functioning condition surveys at BMP test sites. In summary, the focus of the 2001 monitoring effort was on project startup and preliminary data collection. The data collected in the PSCW monitoring program will be used to characterize watershed hydrology, water quality, and BMP effectiveness.

#### **4.0 REFERENCES**

- MFG, Inc., 2001. Quality Assurance Project Plan – Draft, Panoche/Silver Creek Watershed Management and Action Plan, Grant 2000-E02, October 2001.
- USDI - Bureau of Land Management. 1999. Riparian Area Management - Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas. BLM Technical Reference TR 1737-16. Denver, CO.

## TABLES

**Table 1. 2001 Total Monthly Rainfall**

<b>Month</b>	<b>Rainfall Station</b>		
	<b>R-1 (Panoche Rd)</b>	<b>R-2 (Idria)</b>	<b>R-5 (McCullough)</b>
January	3.08	7.44	3.55
February	1.05 <sup>a</sup>	4.36	3.05
March	--	4.56	2.07
April	--	1.92	0.84
May	--	0.12	0
June	--	0	0
July	--	0	0
August	--	0	0
September	--	0	0
October	--	--	0
November	--	--	2.32
December	--	6.68 <sup>b</sup>	0.85

**NOTES:**

-- Indicates time when gauges were non-operational.

a Data collection discontinued on February 27, 2001.

b Gauge non-operational from October through December 11, 2001. Majority of rainfall total shown probably accumulated in November.

## FIGURES

## **APPENDICES**

## **APPENDIX A**

### **Geologic and Geomorphic Characterization of BMP Sites**

## **APPENDIX B**

### **Properly Functioning Conditions Baseline Survey**



